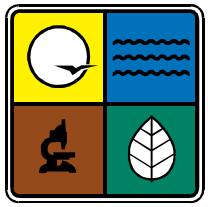


Missouri Department of Natural Resources
Water Pollution Control Program

Total Maximum Daily Load (TMDL)

for

Piney Creek
Oregon County, Missouri

Completed December 26, 2000
Approved January 31, 2001

Total Maximum Daily Load (TMDL)
For Piney Creek
Pollutant: Chlorine

Name: Piney Creek

Location: Near Alton in Oregon County, Missouri

Hydrologic Unit Code (HUC): 11010011-040002

Water Body Identification (WBID): 2614

Missouri Stream Class: C (Class C streams may cease to flow in dry periods but maintain permanent pools which support aquatic life.)[1]

Beneficial Uses: Livestock and Wildlife Watering, Protection of Aquatic Life and Human Health-Fish Consumption

Size of Impaired Segment: 0.1 mile

Location of Impaired Segment: Wholly contained in Northwest Quarter of Section 2, Township 23 North, Range 4 West

Pollutant: Chlorine

Pollutant Source: Alton Municipal Wastewater Treatment Plant

Permit Number: NPDES Permit No. MO-0049492

TMDL Priority Ranking: Medium

1. Background and Water Quality Problems

The Alton Municipal Wastewater Treatment Plant (WWTP) facility is served by an oxidation ditch wastewater treatment plant with a design flow of 0.168 cubic feet per second (cfs). The discharge is regulated by NPDES permit MO-0049492 which was issued November 19, 1999, and expires November 18, 2004. Disinfection of wastewater at this facility down to the level of 400 colonies (of fecal coliform)/100 ml monthly average and 1000 colonies/100 ml daily maximum is required by the Missouri effluent regulation 10 CSR 20-7.015 (4)(B)4. If chlorine is used as a disinfectant, 10 CSR 20-7.015 (4)(B)5 requires dechlorination of the effluent if the outfall is within one mile of a classified stream and the $7Q10^2$ low flow of the receiving stream is

[1] See 10 CSR 20-7.031(1)(F)
[2] The 7-day average minimum flow with a recurrence interval of 10 years. Indicates drought conditions.

less than 50 times the volume of the effluent design flow. Since the Alton WWTP effluent discharge is to a classified stream with a 7Q10 low flow of zero, dechlorination is required. Dechlorination, however, was not required in the latest permit, set to expire in 2004.

The discharge from the Alton WWTP is located in the NW NW, Section 2, T23N, R4W. Piney Creek, like many of the other streams in the upper and middle portion of this watershed, is a "losing stream". A losing stream is one that loses much or all of its flow to the groundwater system. This "losing stream" classification does not affect the chlorine standard. The stream becomes losing within 0.1 mile of the Alton WWTP outfall, hence 0.1 mile is all that is considered to be impaired. Piney Creek continues in a southeasterly direction approximately 15 miles to join the Eleven Point River in the southeastern corner of the county.

According to Missouri Department of Natural Resources (MDNR) Stream Surveys conducted on various dates, (10/5/82, 8/6/83, 9/8/86, and 7/28/93) aquatic life was nonexistent in Piney Creek below the Alton WWTP outfall. The 1983, 1986, and 1993 surveys note black rocks and sludge present. Usually rocks are bleached in the presence of too much chlorine, but any bleaching would be masked by the presence of sewage sludge. The 1993 survey reported a chlorine odor. Experience shows that when an odor of chlorine is present, there is generally an excess of chlorine in the stream.

Dye trace studies were conducted by Jon Kraft, Missouri Department of Natural Resources (MDNR) Division of Geology and Land Survey in October 1984 under low flow conditions and in July 1985 under high flow conditions. The researcher concluded that "water entering the Piney drainage system in the immediate vicinity of Alton and downstream recharges groundwater in that area with discharge of the groundwater (at least in part) at Boze Mill Spring on the Eleven Point River with no other discharge points known."[3] The Alton WWTP is approximately 9.5 miles northwest of Boze Mill Spring. A copy of the study will be retained in the Piney Creek Administrative Record.

2. Description of the Applicable Water Quality Standards and Numeric Water Quality Targets

Designated Uses:
The designated uses of this section of the Piney Creek, WBID 2614, are Livestock and Wildlife Watering, Protection of Warm Water Aquatic Life and Human Health- Fish Consumption . The stream classifications and designated uses may be found at 10 CSR 20-7.031 (1)(C) and Table H.

Anti-degradation Policy:
Missouri's Water Quality Standards (WQS) include the EPA "three-tiered" approach to anti-degradation, and may be found at 10 CSR 20-7.031(2).

Tier I defines baseline conditions for all waters -- it requires that existing beneficial uses are protected. TMDLs would normally be based on this tier, assuring that numeric criteria (such as dissolved oxygen, ammonia) are met to protect uses.

[3] "Alton Dye Trace 1 and 2" Study by Jon Kraft, MDNR, DGLS Geologist, 1985.

Tier II requires no degradation of high-quality waters, unless limited lowering of quality is shown to be necessary for "economic and social development." A clear implementation policy for this tier has not been developed, although if sufficient data on high-quality waters are available, TMDLs could be based on maintaining existing conditions rather than the minimal Tier I criteria.

Tier III (the most stringent tier) applies to waters designated in the water quality standards as outstanding state and national resource waters; Tier III requires no degradation under any conditions. Management may require no discharge or prohibition of certain polluting activities. TMDLs would need to assure no measurable increase in pollutant loading.

This TMDL will result in the protection of existing beneficial uses, which conforms to Missouri's Tier I anti-degradation policy.

Specific Criteria and Numeric Water Quality Target:

The specific criteria for chlorine are found in 10 CSR 20-7.031 Table A, page 17 in the state's standards. The criteria for Warm Water Streams were used. The only beneficial use with chlorine criteria is protection of aquatic life. These criteria are 0.01 mg/L chronic and 0.019 mg/L acute, expressed as Total Residual Chlorine (TRC).

3. Calculation of Load Capacity

Load capacity is defined as the maximum pollutant load that will still attain water quality standards. In this TMDL, the load capacity will be defined by the conditions leading to the highest instream level of TRC. These conditions would occur when the WWTP is running at full capacity and there is no upstream flow to dilute the effluent. The chronic standard of 0.01 milligrams per Liter (mg/L) given in the state's standards would need to be met. The formula for load capacity is given below:

(design stream flow in cfs)(maximum allowable pollutant concentration in mg/L)(5.395) = pounds/day*
*5.395 is the constant used to convert cfs times mg/L to pounds/day.

Given a design upstream flow of zero and a WWTP design flow of 0.168 cfs, solving this equation gives: (0.168 cfs)(0.01 mg/L)(5.395) = 0.009 pounds/day TRC.

4. Load Allocation (Nonpoint Source Load)

There are no known nonpoint sources of TRC in the impaired stream segment. Thus the nonpoint source load allocation for TRC is zero pounds per day.

5. Waste Load Allocation (Point Source Loads)

The point source waste load allocation would be calculated by the formula

(WWTP design flow in cfs)(effluent TRC limit in mg/L)(5.395) = TRC pounds/day

This formula gives: (0.168 cfs) (0.01 mg/L) (5.395) = 0.009 pounds/day.

6. Margin of Safety

The Margin of Safety is implicit based on the following conservative assumptions. The Wasteload Allocation calculation assumes the critical low flow of zero when the Alton WWTP is discharging at a magnitude as high as its design flow. This circumstance would be a rare occasion. Also, Piney Creek is effluent dominated, therefore the water quality is really the Alton effluent quality. Since aquatic life seems to be more sensitive to TRC in warm weather, the Missouri standard for TRC provides an additional intrinsic margin of safety during fall, winter and spring. The permit monitoring will provide assurance that the WQS will be achieved and therefore provides another degree of conservatism in the TMDL.

7. Seasonal Variation

Because the impairment is due to a single point source, and there are no nonpoint sources, the consideration of the critical low flow takes into account seasonality. It would be at that low flow where concern would arise as to not meeting the chlorine permit limit and thus violating state standards. The state's standard of 0.01 mg/L is protective of the most sensitive temperature conditions, warm water, and at other seasons there is an additional intrinsic margin of safety.

8. Implementation and Monitoring Plans

Alton NPDES permit MO-0049492 was re-issued November 19, 1999, and expires November 18, 2004. The present permit allows 1.0 mg/L of TRC in the effluent. This amount is not protective of aquatic organisms in Piney Creek. A limit of 0.01 mg/L will protect organisms adequately. Implementation will be accomplished through permit action. The permit will be modified to include the requirement of dechlorination, with a monthly average and daily maximum of 0.01 mg/L TRC and quarterly monitoring of TRC in the effluent. As with all of Missouri's TMDLs, if continuing monitoring reveals that water quality standards are not being met, the TMDL will be reopened and re-evaluated. This TMDL will be incorporated into Missouri's Water Quality Management Plan.

9. Reasonable Assurances

MDNR has the authority to write and enforce NPDES permits. Inclusion of a dechlorination requirement and effluent limits into a state NPDES permit, and quarterly monitoring of the effluent reported to MDNR, should provide reasonable assurance that instream water quality standards will be met.

10. Public Participation

These water quality limited segments are included on the approved 1998 303(d) list for Missouri. MDNR's Water Pollution Control Program developed this TMDL. A public notice period from December 8, 2000 to January 7, 2001, was held. Groups receiving the public notice announcement include the Missouri Clean Water Commission, the affected facility, the Water

Quality Coordinating Committee, the TMDL Advisory Committee, Stream Team volunteers in the watershed, and others that routinely receives the public notice of NPDES permits. Copies of the notice, comments and MDNR's response to the comments are on file with MDNR.

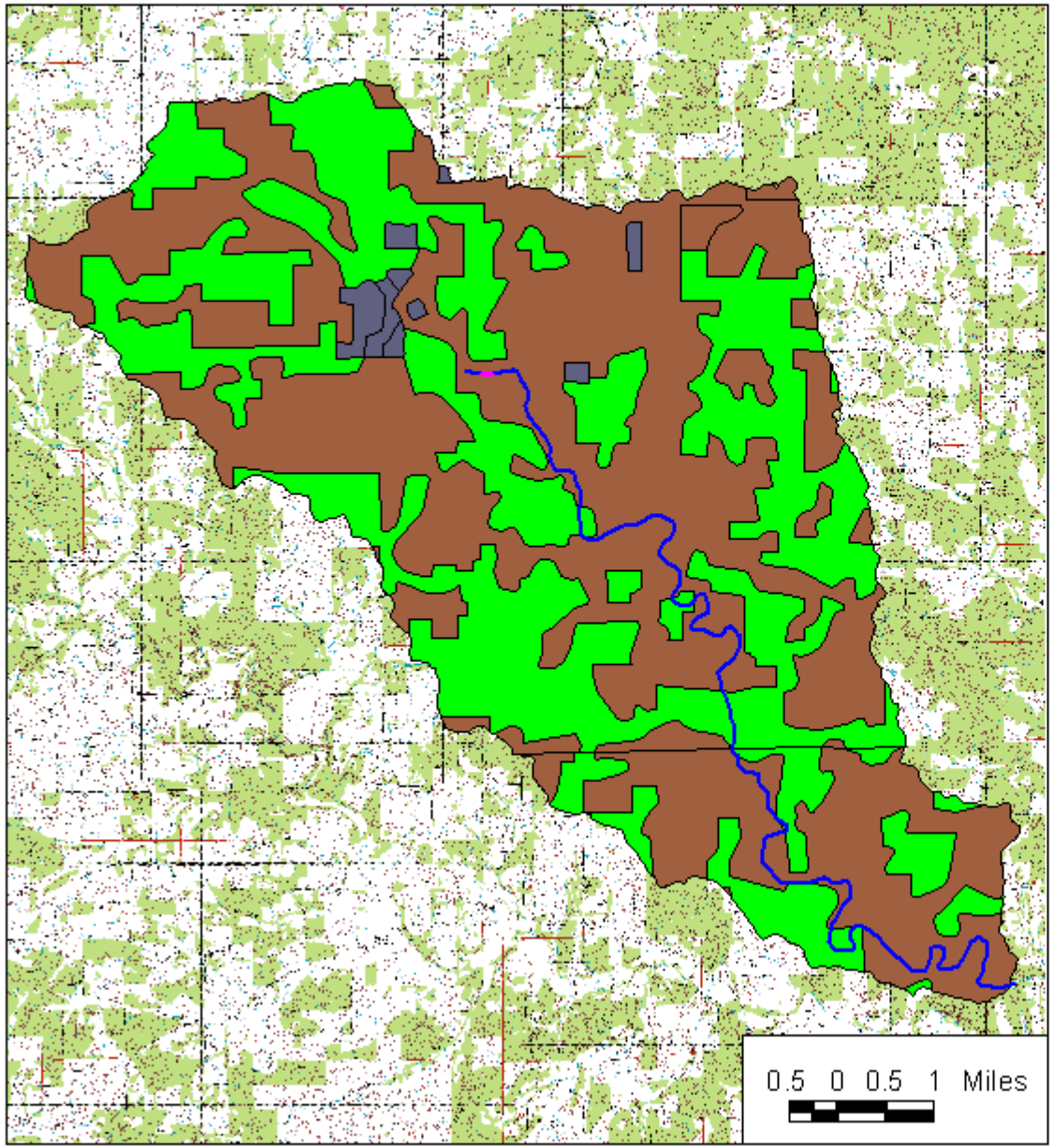
11. Appendices and List of Documents on File with MDNR

Appendix A--Land use map for Piney Creek watershed
Appendix B--Topographic map showing WWTP location and impaired segment

Documents on file with MDNR:

Alton WWTP--NPDES Permit No. MO-0049492
Copy of letter from US Fish and Wildlife Service regarding habitat in the Piney Creek area regarding the endangered Indiana bat
Public notice announcement
Fact Sheet

Appendix A. Land Use Types for Piney Creek Watershed (11010011-040002)



Land Use Type		Area (acres)
Urban or Built-up Land		464
Residential	381	
Commercial and Services	83	
Agricultural Land		12072
Cropland and Pasture	12072	
Forest Land		17166
Deciduous Forest Land	16989	
Evergreen Forest Land	177	

Appendix B. Map of Impaired Stream Segment
Piney Creek, Oregon County, Missouri